

Education and Training Background of Audiologists in the Diagnosis and Treatment of
Hyperacusis

Capstone

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By

Ashley N Mason

Graduate Program in Speech and Hearing Science

The Ohio State University

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Committee:

Gail M Whitelaw, Ph.D., Advisor

Christina M Roup, Ph.D.

Christy Goodman, Au.D.

Approved by:

Advisor

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Abstract

The aim of the present study was to determine the academic and clinical training background of practicing audiologists on the assessment and treatment of hyperacusis. Two hundred and sixty-one subjects selected from the American Academy of Audiology membership database responded to a 28-item research survey. Questions targeted the education and training that practicing audiologists received both during and after their graduate academic career in the areas of hyperacusis and tinnitus. Subjects were contacted two times via electronic mail asking for voluntary participation. Results showed agreement among respondents that hyperacusis was a part of the audiology scope of practice; however, few respondents were actually “confident” in addressing hyperacusis issues with their patients. The results of the present study support a need for an increase of education, research, and resultant continuing education opportunities for students and audiologists in the area of hyperacusis.

Dedication

I dedicate this project to my family who supported me for the past 8 years of school, and all my crazy ideas. I also want to dedicate this project to Dr. Gail Whitelaw, because without a doubt, I would not be where I am today without the guidance, wisdom, and support she has given me since my first year at The Ohio State University.

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Vita

May 2005East Fairmont High School, Fairmont, WV

May 2009B.S. Speech Pathology & Audiology

2010 to 2011Graduate Teaching Assistant, Department of
Speech & Hearing Science, The Ohio State
University

2011 to 2012LEND Audiology Trainee, Nisonger Center,
The Ohio State University Wexner Medical

2012 to 2013 4th-year Externship at the Mountain Home
VA Medical Center, Mountain Home,
Tennessee

Fields of Study

Major Field: Audiology

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CHAPTER 1

Introduction

The field of audiology originated in the 1940s from a range of fields, such as deaf education, psychology, medicine, and speech therapy that provided rehabilitative services to World War II veterans who had experienced hearing loss (Katz, 2009; Stach 2009). Over time, those once rudimentary services evolved into a recognized and specialized healthcare profession, audiology, which grew from a rehabilitation-focused service to a breadth of diagnostic and treatment/management services (Katz, 2009; Stach, 2009). Audiology has changed significantly in the past 50 years. The profession's development and growth is marked by many monumental changes including the lifting of the ethical restriction prohibiting audiologists to dispense hearing aids in the 1970s as well as the role in the programming and rehabilitation for patients with profound hearing loss receiving cochlear implants (Katz, 2009; Stach, 2009). Recently, the profession of audiology has evolved from the master's degree level of preparation to a Doctor of Audiology (AuD) requirement, which may lead to a continued growth in responsibility of audiologists. One concern is that audiologists may not be prepared to address some of the new demands of the AuD degree. However, as demonstrated in the first 50 years of the profession, new technology and knowledge, and expanded scope of practice lead to new developments and advances in specialty areas of the field.

The focus of this capstone is on the unique auditory disorder, hyperacusis, which though has been described in the literature dating back to the 1940s, is currently gaining increased clinical attention. Secondary focus of this project is on the area of tinnitus due to the commonly reported comorbidity of the two disorders in the literature, as well as the parallels between both the proposed mechanisms and sound therapy protocols used for management of hyperacusis and tinnitus (Tyler, Noble, Coelho, Haskell, & Bardia, 2009). Hyperacusis and tinnitus are theorized to arise from the peripheral auditory system, and in most cases, are also theorized to be a product of central mechanisms (Jastreboff, 1990; Henry et al., 2005). The involved central mechanisms, the central auditory system, limbic system, and autonomic nervous system, have the potential to create or exacerbate psychological effects such as general anxiety disorder and depression associated with both hyperacusis and tinnitus (Jastreboff, 1990; Jastreboff & Jastreboff, 2000; Jastreboff & Jastreboff, 2002; Goebel & Floetzinger, 2008; Tyler, Haskell, Gogel, & Gehringer, 2008).

The best way to paint the picture of the importance of the current project is through a case study of misophonia, a unique subtype of hyperacusis. Imagine a 23-year-old medical student with no significant medical or otologic history presenting with the primary complaint of longstanding sensitivity to certain sounds with subsequent psychological effects. Specifically, the individual reported severe emotional reactions, such as anxiety, anger, and stress, to sounds originating from the body, including lip smacking, chewing, and mouth breathing. She reported use of earplugs for many years as

a self-coping strategy. One could visualize the debilitating effects this could have on a medical student whom spends the majority of her time closely surrounded by other students in the classroom environment. The individual stated that she eventually quit going to class as a result of the emotional reactions triggered by her peers, which was possible in her case since her courses were available on the web in addition to live lectures. She described experiencing this sensitivity since she was approximately 12 years old, and sought consultation with various healthcare professionals including psychology and psychiatry. Until the summer of 2011, at which time a diagnosis of misophonia was attached to her complaints, the consensus among those healthcare professionals, as reported by this young woman, was “she’s crazy”. Misophonia, described by some experts in the field as a subtype of hyperacusis, is a sound sensitivity disorder, which is managed through modified tinnitus management protocols. At that time, the individual was referred to psychology for cognitive behavioral therapy in order to address her significant emotional distress. Other recommendations included elimination of earplugs, use of masking devices, and because of her knowledge as a medical student, obtaining information from *Hyperacusis: Mechanisms, diagnosis, and therapies*, a textbook by Baguley and Andersson (2007). Unfortunately, she was lost to follow-up, therefore her outcome with the proposed management options could not be evaluated. The questions raised here in regards to this specific case study are many. Why was she not able to find a name for her condition far less recommendations to potentially provide help and/or relief for approximately 13 years? What role do audiologists and/or other healthcare

professionals play in this type of clinical situation? How can assessment/management for those with similar symptoms be improved in the future?

To start answering these questions a review of the current literature on hyperacusis and tinnitus was completed. This was followed by an analysis of current audiology programs with the thought that audiology programs should be a reflection of the current continued growth of this profession providing insight into the current status of hyperacusis and tinnitus as a focus for the profession of audiology. Currently, there are reported to be 74 Council of Academic Accreditation accredited audiology graduate programs in the United States (AAA, 2012; ASHA, 2012). In a review of available current graduate programs' curriculum, only nine programs offer courses specific to tinnitus and/or hyperacusis. A recent survey by the Audiology Foundation of America (AFA) posed the question of what constitutes an "ideal AuD program" to audiologists across the United States, Mexico, and Canada (Ulinski & Paarlberg, 2010, p. 26). Included within the survey were questions regarding diagnostic audiology course work and laboratory requirements. Among other areas of assessment and management, tinnitus was consistently noted as a diagnostic area in which students should be educated and trained "in the full breadth of practice" (Ulinski & Paarlberg, 2010, p. 29).

Similarly, Henry, Zaugg, & Schechter (2005) electronically surveyed the 60 accredited audiology programs in 2005 regarding the status of academic and clinic preparation of their students in the area of tinnitus at that time. They received 47 responses. Results indicated that 13 of the 47 programs responded that a course was already being offered or plans to offer a course solely focused on tinnitus existed.

Further, the short survey inquired about each programs' philosophy regarding the best tinnitus management approach and their opinion on the appropriateness of tinnitus management in the audiology scope of practice. Results regarding each programs' approach to tinnitus management revealed a great variability among the programs, with one program reporting that tinnitus should be managed by physicians (Henry, Zaugg, & Schechter, 2005). The lack of uniformity among how programs implement training on tinnitus management creates confusion in the field, which may lead to audiologists believing they are not well trained in the area of tinnitus or that they are not able to help their patients who report tinnitus (Tyler, 2006). Finally, responses from the Henry, Zaugg, & Schechter (2005) survey revealed that the majority of programs (41) surveyed indicated that tinnitus management should be within the audiology scope of practice. Clearly, results of the Ulinski and Paarlberg (2010) and the Henry, Zaugg, and Schechter (2005) recognized the importance of academic and clinical training specific to tinnitus in order to meet the need of services for tinnitus patients. However, this combination of minimal preparation of some academic programs with the lack of uniformity among the programs who do report preparing their student may lead to the negative attitudes of audiologists regarding tinnitus, which is a major obstacle of tinnitus treatment (Tyler, 2006).

Hyperacusis is associated with debilitating effects on activities of daily life similar to the physical and social impacts associated with hearing impairment and/or tinnitus, including anxiety, insomnia, and depression (Herbert, Fullum, & Carrier, 2011; Martines et al., 2010; Baguley & Andersson, 2007; Henry et al., 2005; Nondahl et al.,

2002; Jastreboff & Jastreboff, 2000; Salonen, Johansson, & Joukamaa, 2007; Zoger, Svedlund, & Holgers, 2006). Formal didactic and clinical preparation of audiologists in the area of hyperacusis equip audiologists with the ability to address this disorder in patients leading to better healthcare management (Tyler et al., 2008). Though neither the Henry, Zaugg, and Schechter (2005) nor the Ulinski and Paarlberg (2010) study directly addressed hyperacusis, the existing parallels between hyperacusis and tinnitus suggest that an increase in educational focus on tinnitus would result in concomitant increased focus on the assessment and management of hyperacusis (Jastreboff & Jastreboff, 2000; Jastreboff & Jastreboff, 2002).

Therefore, the purpose of this study was to evaluate through survey research the education and training background of audiologists in the diagnosis and treatment of hyperacusis, in accordance with the audiology scope of practice. The audiology scope of practice as stated by both the American Speech-Language-Hearing Association (ASHA, 2004) and the American Academy of Audiology (AAA, 2004) includes the practice of audiologists to assess, diagnose, and provide management/treatment to impairments of the auditory system. By definition of hyperacusis as an auditory disorder thought to arise, at least in part, from the peripheral auditory system, assessment and management of hyperacusis is supported within the audiology scope of practice (Jastreboff, 1990; Jastreboff & Jastreboff, 2002). It was hypothesized that the results of this survey would reveal a lack of formal education and training as well as clinical experience in working with patients reporting hyperacusis, consistent with the minimal available current literature in this area.

CHAPTER 2

Literature Review

Hyperacusis refers to the “abnormally strong reactions occurring within the auditory pathways result[ing] from exposure to a moderate sound”, which results in a physical discomfort (Henry, Zaugg, & Schechter, 2005; Jastreboff & Jastreboff, 2000, p. 163). However, a universally accepted definition of hyperacusis does not exist, but rather hyperacusis is often incorrectly used as a global term to represent all variations of sound tolerance that has been described in the literature: loudness recruitment, misophonia, and phonophobia (Baguley, 2010). There is limited literature focused solely on hyperacusis, but rather hyperacusis is seen commonly seen in literature discussed alongside tinnitus. Hyperacusis, and the recently coined subtype of hyperacusis, misophonia, have been best described as the “lesser-known siblings of tinnitus” (Schwartz, Leyendecker, & Conlon, 2011, p. 42). Therefore, to understand the mechanisms and management of hyperacusis, one must learn and understand the mechanisms and proposed management protocols of tinnitus.

Tinnitus

Definition

Tinnitus is defined as an auditory sensation occurring in the absence of a peripheral signal and is commonly reported as a ringing or buzzing sound (Hoffman & Reed, 2004). Tinnitus affects approximately 8-20% of the population and can be

associated with a decreased quality of life including depression, anxiety, and sleep disturbances (Herbert, Fullum, & Carrier, 2011; Martines et al., 2010; Baguley & Andersson, 2007; Henry et al., 2005; Nondahl et al., 2002; Jastreboff & Jastreboff, 2000; Salonen et al., 2007; Zoger et al., 2006).

Etiology and Models of Tinnitus

Various models exist to explain tinnitus perception, which form the basis of assessment and management protocols described in the following section. First, the medical model acknowledges the generation of tinnitus as a symptom of an underlying medical disease or disorder. Therefore, a necessary first step is to determine the need for medical evaluation. Etiology of tinnitus is often difficult to identify, but is most commonly the result of cochlear hearing loss (Tyler, 2006). Yet, tinnitus has also been associated with a range of otologic diseases and other non-otologic disorders such as head and neck disorders, systemic diseases, temporomandibular joint dysfunction (TMJ), Meniere's disease, and vestibular schwannoma (Tyler et al., 2009; Henry, Dennis, & Schechter, 2005; Henry et al., 2005; AAO-HNS, 1995). Similarly, many prescription drugs have been linked to the onset or exacerbation of tinnitus (Henry et al., 2005). Audiologists are trained to recognize the "red flags" indicative of medical referral which typically manifest as a sudden onset of tinnitus, unilateral tinnitus, pulsatile tinnitus, or the sudden change in perception of tinnitus, as well as presence of tinnitus in combination of sudden or asymmetrical hearing loss (Tyler et al., 2008; Henry, Zaugg, & Schechter, 2005; Jastreboff & Jastreboff, 2000). Ignoring the need for medical evaluation could lead to long-term detrimental effects. Therefore, audiologists need to make appropriate

referrals to otolaryngologists or primary care physicians for assessment of the need for medical management in order to address any underlying medical conditions.

Additional models used to describe the generation of tinnitus focus on the neurophysiologic and psychological aspects of tinnitus. The neurophysiologic model focuses on generation site of tinnitus, whereas, psychological models focus on the learned behavior of the individual in response to the tinnitus (Tyler, 2006). Though described separately, the models are connected in terms of recognizing the influence both the peripheral and central systems, and the idea that “one cannot have a change in thinking or behaving without some neurophysiological correlate” (Tyler, 2006, p. 4). Many different explanations have been provided in the literature over the years, however, the well-known neurophysiologic model of tinnitus described by Jastreboff (1990) will be the model primarily used throughout the remainder of this discussion on tinnitus due to the parallels that will later be made to hyperacusis.

The emergence and perception of tinnitus has been described in three main steps: generation, detection, and perception and evaluation as shown in Figure 1 (Jastreboff 1990; Jastreboff & Hazell, 1993; Jastreboff & Jastreboff, 2002). Generation describes tinnitus as arising from either peripheral auditory damage or as an abnormal signal arising from the cochlea or auditory nerve fibers independent of cochlear hearing loss (Jastreboff, 1990; Jastreboff & Hazell, 1993; Jastreboff & Jastreboff, 2002; Tyler, 2006). From a physiologic model viewpoint, the generation of tinnitus is abnormal activity occurring, in most cases, somewhere in the auditory periphery that is abnormally enhanced and detected by the central system as a meaningful sound (Jastreboff &

Jastreboff, 2002; Jastreboff & Hazell, 1993). The next step, detection, refers to the central systems recognition of and learned response to the sound (tinnitus). The final step or stage of this model, perception and evaluation, is usually what differentiates bothersome tinnitus from non-bothersome tinnitus. This stage is completed at the level of the auditory cortex, and is the point in which the autonomic and limbic systems become involved. The autonomic nervous system is responsible for automatic functioning such as controlling the heartbeat or dilating the pupils of the eyes, whereas the limbic system regulates emotions such as fight-or-flight. At this stage, the auditory cortex evaluates the tinnitus, and based on pre-conditioned or learned responses as navigated by the autonomic and limbic systems, perceives the tinnitus in either a positive or negative way (Jastreboff & Hazell, 1993). The final stage of the neurophysiologic model is targeted during management to change the learned response of viewing the tinnitus as negative sound.

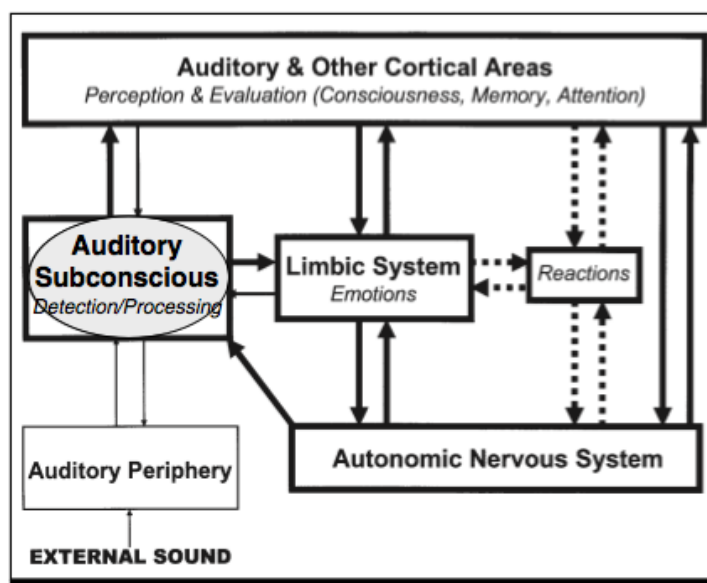


Figure 1: Neurophysiologic Model of Tinnitus (Jastreboff, 1990)

Assessment and Management

Various approaches to the assessment and management of tinnitus are available, including two well-known approaches: Tinnitus Retraining Therapy (TRT) or Tinnitus Habituation Therapy (THT) and Audiologic Tinnitus Management (ATM) (Henry et al. 2005; Jastreboff, 1990). Differences exist between the two approaches, however, the assessment protocol in each approach are relatively similar identifying the importance of case history (or intake interview), subjective questionnaires, determination of need for medical evaluation, and audiologic evaluation including tinnitus-specific testing such as tinnitus pitch and loudness matching, minimal masking levels, and loudness discomfort levels (Henry, Zaugg, & Schechter, 2005; Jastreboff & Jastreboff, 2000). However, the implemented assessment protocol molds the management approach used with patients, with one approach not being suitable for all but patients. Review of the literature implicates the idea that patients may not always benefit from same the approach, and that audiologists need to be cognizant of what approach the patient is a best candidate for and recognition that some patients may require management beyond TRT and ATM (Henry et al., 2005; Henry, Zaugg, & Schechter, 2005).

The neurophysiological model provided by Jastreboff (1990) is focused on the use of TRT (or THT) to be used as the treatment of tinnitus (Henry, Zaugg, & Schechter, 2005; Jastreboff & Jastreboff, 2000; Jastreboff, 1990). The effectiveness of TRT and THT is based on the models of neural plasticity in that the protocols utilize sound therapy in combination with strict informational counseling to re-train the brain to perceive the tinnitus as a neutral sound (Jastreboff & Jastreboff, 2002). Further, the protocols promote

habituation and desensitization by de-intensifying the connection of the auditory system with the limbic and autonomic nervous systems (Jastreboff & Jastreboff, 2002). Whereas, ATM is an approach to assessment and management provided by Henry et al. (2005) that is comprised of a more relaxed version of TRT counseling in combination with amplification and other sound therapy devices.

Another management model used with tinnitus is cognitive behavioral therapy (CBT), which is an intensified counseling model provided by psychologists for those individuals who exhibit significant emotional reactions and debilitating effects on daily living (Newman, Sandridge, Meit, & Cherian, 2008; Tyler et al., 2008; Henry et al., 2005; Henry, Zaugg, & Schechter, 2005). Psychological distress can either be pre-existing disorder or emotional reactions resulting from the tinnitus. Tyler (2006) described a cycle of worrying about tinnitus leading to an increase in tension and anxiety, which then leads to a more heightened focus on the perception of the tinnitus. This cycle could have a greater impact on those individuals who already experience a mental health disorder such as anxiety, depression, or panic disorder (Goebel & Floetzinger, 2008). CBT is typically used in addition to TRT or ATM protocols. For example, a patient presenting with psychological issues such as anxiety or depression in combination with their tinnitus should be considered for a joint therapy approach combining TRT or ATM with CBT. Within this approach, psychologists work to address those patients' emotional needs that are outside of what traditional audiologic counseling can ethically offer. Further, psychologists work concurrently with audiologists to assist in the patient

learning process of how to implement and successfully use masking devices along with self-coping strategies to alleviate their tinnitus.

Hyperacusis

Definition

Andersson, Lindvall, Hursti, and Carlbring (2002) defined hyperacusis as, “[an] unusual intolerance of ordinary environmental sounds” (p. 545). This definition was adopted from Vernon (1987) and is relatively broad in terms of what constitutes an “ordinary environmental sound”. Other definitions of hyperacusis have included “a disproportionate growth in subjective loudness of sounds” or simply the “increased sensitivity to sound” (Valente, Goebel, Duddy, Sinks, & Peteroin, 2000, p. 295; Jastreboff & Jastreboff, 2000, p. 162). In general, hyperacusis can be concluded as an abnormal response to an environmental sound, with no psychological effect.

Prevalence of Hyperacusis

The prevalence of hyperacusis among the general population is reported as highly variable, with ranges of 5.9% - 15% of the general population (Andersson et al.; 2002; Fabijanska, Rogowski, Bartnik, & Skarzynski, 1999). One contributor to the varied prevalence rates is the use of survey research. Andersson et al. (2002) reported a prevalence of hyperacusis among participants in Sweden at 8% from participants in a postal survey and at 9% from participants in an online survey. The population who responded to a voluntary survey may have been biased by those who have hyperacusis being more likely to respond than those who do not experience sound tolerance issues.

Therefore, the prevalence rates presented by the Andersson et al. (2002) may be inflated relative to the true prevalence of hyperacusis in the general population.

Another contributor that may lead to the variability found among prevalence studies, as well as the limited acknowledgement in the clinical setting is the lack of agreement of the definition of hyperacusis, and its inaccurate use to describe other sound tolerance issues (Baguley, 2010; Baguley & Andersson, 2007). Of particular importance is the differentiation between hyperacusis and loudness recruitment, which can easily be confused in the clinical setting.

Loudness recruitment, a symptom of cochlear hearing loss, is the abnormally rapid growth of loudness resulting from a reduced dynamic range due to the loss of outer hair cells, and subsequent loss of the cochlear amplifier (Moore & Oxenham, 1998). In the Andersson et al. (2002) study, prevalence rates varied based on criteria of participants with and without hearing impairment such that prevalence rates of 9% (online survey) and 8% (postal survey) were reported when those individuals with hearing loss were included, but when excluded, the rates dropped to 7.7% and 5.9% for the online and postal surveys, respectively. Especially through voluntary report, one cannot separate those individuals with hearing loss suffering from sound tolerance issues resulting from loudness recruitment from those who suffer from true hyperacusis. A general review of the literature indicates both ideas that hyperacusis may exist independently or concomitantly with cochlear hearing loss (Hazell, 2002; Jastreboff & Jastreboff, 2001; Anari et al., 1999). This conclusion leads to the continued need to differentiate the two phenomena.

Similar difficulties have been seen regarding differentiation of hyperacusis from loudness recruitment in individuals with Williams syndrome. Hyperacusis is reported as highly prevalent among individual with Williams syndrome. *Williams syndrome (WS)* is a neurodevelopmental disorder characterized by intellectual disability, varied psychical impairments, and a particular personality profile (Elsabbagh, Cohen, Cohen, Rosen, & Karmiloff-Smith, 2011; Zarchi, Attias, & Gothelf, 2010). The sound tolerance issues exhibited by individuals with WS have been described in the literature using various terminology including but not limited to hyperacusis, phonophobia, and auditory fascination, with extremely variable prevalence rates (Zarchi et al., 2010; Gothelf, Farber, Raveh, Apter, & Attias, 2006; Van Borsel, Curfs, & Fryns, 1997; Klein, Armstrong, Greer, & Brown, 1990).

The associations drawn between WS and hyperacusis are primarily based on anecdotal criteria gathered from parents through survey and questionnaire tools. For example, Gothelf et al. (2006) used the Hyperacusis Screening Questionnaire with 49 mothers of children with WS. Results indicated that 84% of the children had hyperacusis, which was determined by the positive history of “aversive responses to noise (crying and exaggerated startle response)” (p. 393). However, this prevalence rate found by Gothelf and colleagues (2006) may be artificially inflated for the same argument previously discussed regarding the difficulty separating individuals with hyperacusis versus loudness recruitment. WS is also characterized by cochlear hearing impairment, which would make dividing the line between whether the sound tolerance issues exhibited by

individuals with WS was a result of hyperacusis or loudness recruitment more difficult (Johnson, Comeau, & Clarke, 2001).

Finally, other sound tolerance disorders have been discussed in the literature, reported as subtypes or sister disorders of hyperacusis, misophonia and phonophobia. *Misophonia* and *phonophobia* are sound tolerance issues thought to result from a heightened peripheral connection with central systems: the limbic and autonomic nervous systems, which lead to the emotional dislike of sound (Jastreboff & Jastreboff, 2001). Unlike hyperacusis, misophonia is hypothesized to be caused by the learned psychological or emotional connection to a particular sound independent of its physical characteristics. *Misophonia* refers to the negative emotional reaction to sound including hate or anger, whereas, *phonophobia*, a subtype of misophonia, refers to the emotional *fear* of sound (Jastreboff & Jastreboff, 2002; Jastreboff & Jastreboff, 2001). The importance of accurate differentiation among hyperacusis, misophonia, and phonophobia is recognition of the need to possibly address emotional and psychological distress associated with sound.

Misophonia is a disorder that is manifested from the tie between the auditory system with the autonomic and limbic systems (Jastreboff & Jastreboff, 2002; 2001). With misophonia, bodily sounds such as lip smacking, and chewing, are learned and perceived in a negative way by the individual, which elicits feelings of hate, anger, or annoyance (Schwartz et al., 2011; Jastreboff & Jastreboff, 2002). This association between sound and emotion is dependent on many factors including pre-existing evaluation of sounds, environment in which the sound is presented, and the psychological

make-up of the individual (Jastreboff & Jastreboff, 2001). Phonophobia is a further subtype of misophonia and is a result the same auditory and limbic and autonomic nervous systems connections (Baguley & Andersson, 2007; Jastreboff & Jastreboff, 2002; 2001). However, with phonophobia, fear is the dominant emotion elicited in response to everyday sounds such as vacuum cleaners, dishwashers, loud speech, traffic, etc., where the individual “fears” that environmental sounds are going to cause hearing loss or increase their sensitivity to sounds (Hazell, 2002; Jastreboff & Jastreboff, 2001). Over time these reactions to sound become a learned response, which functions as a feedback loop, with a heightened response each time the particular sound is heard.

Some of the literature presents the idea that an individual initially presents with hyperacusis, which later develops into other sound sensitivity disorders, misophonia and phonophobia, due to the psychological stress resultant from the hyperacusis (Tyler et al., 2009). However, misophonia and phonophobia are also reported as isolated disorders (Jastreboff & Jastreboff, 2001). As discussed with loudness recruitment, it is important to accurately differentiate each hyperacusis, misophonia, and phonophobia from one another, as even though the disorders can co-occur, each disorder needs to be addressed individually with a slightly varied management protocol (Jastreboff & Jastreboff, 2002; 2001).

Etiology of Hyperacusis

Similar to tinnitus, the etiology is often difficult to identify, and the need for medical evaluation must be considered prior to implementation of management. Hyperacusis can be clinically seen as an isolated disorder or as a concomitant symptom

of a myriad of auditory and other non-auditory disorders and diseases including but not limited to noise-induced hearing loss, perilymphatic fistula, acoustic shock syndrome, Bell's Palsy, head injuries, Lyme disease, and migraines (Jansen, Helleman, Dreschler, & de Laat, 2009; Baguley & Andersson, 2007; Westcott, 2006; Hallberg, Hallberg, Johansson, Jansson, Wiberg, 2005; Nields, Fallon, & Jastreboff, 1999; Fukaya & Nomura, 1988; Kayan & Hood, 1984).

Though the current literature is limited, hyperacusis has also been linked as an auditory disorder in individuals with Autism Spectrum Disorder. *Autism Spectrum Disorders* (ASD), based on the ICD-10 and DSM-IV criteria as childhood autism and autistic disorder, respectively, are viewed as a developmental delay identified based on meeting all three criteria of "severe impairment of reciprocal social interaction, severe impairment of reciprocal communication (including but not exclusive to problems with language use), and severe restriction of imagination and behavioral repertoire" (Gillberg, 2009, p. 42). Prominent sensory deficits including atypical reactions to auditory stimuli is commonly reported in Autism Spectrum Disorders, with reports revealing decreased loudness discomfort levels and steeper loudness growth curves for children and adults with ASD in comparison to normal controls (Stiegler & Davis, 2010; Khalifa et al., 2004). Individuals with ASD exhibit atypical behavior or hypersensitivity to moderate level or normal environmental sounds, which is consistent with the definition of the auditory disorder, hyperacusis (Vernon, 1987; Westcott, 2010).

The Relationship of Hyperacusis and Tinnitus

Physiologically, hyperacusis is reported as an auditory disorder that is generated from increased activity of auditory nerve fibers that can be manifested with or without a concomitant hearing loss (Tyler et al., 2009). There is minimal involvement of the limbic and autonomic nervous systems in hyperacusis, therefore, responses to sounds are based purely on loudness sensitivity, and are independent of any emotional/psychological connections (Jastreboff & Jastreboff, 2000). Proponents of the neurophysiologic model recognize that hyperacusis is generated from similar peripheral and central mechanisms used to describe tinnitus. Specifically, the theory of auditory gain leading to the generation of tinnitus can also lead to the increased sensitivity to environmental sounds (Jastreboff, 1990; Jastreboff & Hazell, 1993; Jastreboff & Jastreboff, 2000; Jastreboff & Jastreboff, 2002).

This shared relationship is used to support the common co-morbidity of hyperacusis and tinnitus (Jastreboff & Hazell, 1993; Jastreboff & Jastreboff, 2002). Hyperacusis has been reported to affect approximately 40% of the tinnitus population, and in some cases, hyperacusis has often been reported to present itself prior to the onset of tinnitus (Goebel & Floetzing, 2008; Jastreboff and Jastreboff, 2002; Jastreboff & Hazell, 1993). In a study by Goebel and Floetzing (2008), of 163 patients reporting chronic tinnitus, 59% had hyperacusis as evaluated using the Structured Tinnitus Interview, with 24% reporting an onset of hyperacusis prior to their tinnitus.

Assessment and Management of Hyperacusis

The loosely shared neurophysiologic model used to describe both disorders allows hyperacusis to follow a comparable assessment and management models to that of tinnitus. Hyperacusis assessment protocols differ only slightly from tinnitus assessment, and include a detailed case history including assessment of the need for medical evaluation, subjective questionnaires, and audiologic evaluation including loudness discomfort level assessment (Tyler et al. 2008; Henry et al., 2005; Henry, Zaugg, & Schechter, 2005; Jastreboff & Jastreboff, 2000). Similarly, management models of hyperacusis are derived from modified versions of TRT and ATM, with some literature concluding that use of TRT and CBT in a combined approach provides the most benefit for patients (Westcott, 2010). Management protocols include the use of patient education, counseling, and sound therapy protocols. As with tinnitus, sound therapy is achieved through use of hearing aids, maskers, or noise generators. However, management approaches for hyperacusis focus on desensitization rather than masking (Tyler et al., 2008; Henry, Zaugg, & Schechter, 2005; Jastreboff & Jastreboff, 2002; Jastreboff & Jastreboff, 2000).

Clinical Implications of Hyperacusis

Assessment, diagnosis, and management for impairment of the auditory system are cornerstones of the scope of practice of audiology, as outlined by both the American Academy of Audiology (AAA, 2004) and the American Speech-Language-Hearing Association (2004). With the growth from a Masters degree to a professional doctorate (AuD), the profession is allowed the opportunity to continually expand the breadth and

depth professional services, and integration with other healthcare professionals in various areas. Hyperacusis is such a disorder needing this support from audiology.

Based on review of the literature, hyperacusis is an existing auditory disorder within various patient populations that has the potential to create or exacerbate debilitating effects. However, despite the existence of protocols, techniques, and standards for the assessment and management for hyperacusis and tinnitus, professional practice guidelines do not yet exist, which leads to continued patient difficulty locating healthcare services, and a grey area for interpretation by the individual audiologist (Tyler et al., 2009; Tyler et al., 2008). Audiologists are reported as the key players in the TRT and ATM assessment/management protocols for hyperacusis and tinnitus (Henry et al., 2005; Jastreboff & Jastreboff, 2000; Jastreboff, 1990). The question arises if there opportunities for audiologists to gain this information. The current project explores how the profession of audiology is providing preparation to students and practicing audiologists in the assessment and management of hyperacusis, with hopes to identify areas where the profession can continue to grow and be refined to meet patient needs and expectations.

CHAPTER 3

Methods

Subjects

Subjects were recruited based on active membership in AAA. A group of 1,302 potential subjects nationwide was compiled by randomly selecting a sample of AAA members from each of the 50 United States plus the District of Columbia (DC) based on availability of contact information for practicing audiologists. An equal number of participants were not selected from each state, but rather the proportion of participants selected from each state varied with the number of audiologists in the state. Subjects were selected from only 46 of the 50 states, as contact information was not available and could not be accessed during the selection process for AAA members from Delaware, Idaho, Michigan, and Virginia for unknown reasons. The subjects were initially contacted via a recruitment email and asked to participate in a research survey. The recruitment email is included in Appendix A. All subjects were contacted via email twice during the study, initially to participate in the study, and again in 2 weeks as a reminder request to participate in the study. No other contact was made with the potential subjects. Identifying information was not requested, and responses remained anonymous. However, all participants were invited to contact the investigator via electronic mail with questions, comments, or to request final survey results. All protocols were approved by

the Social and Behavioral Sciences Institutional Review Board at The Ohio State University.

Questionnaire

A 28-item questionnaire was developed based on a review of the current literature related to hyperacusis and tinnitus. Questions were developed related to the clinical practice aspects of these disorders along with questions related to the clinical education and training of audiologists who work with this population of patients. Questions targeted areas of graduate education, post-academic training, clinical experience, and current attitudes of the audiologist subjects in relation to their practice with patients who have hyperacusis. A primary closed-ended question format was used throughout the study to obtain specific information regarding education and clinic training, as well as to create a clear, user-friendly questionnaire. In addition, open-ended questions were used to obtain demographic information (e.g. type of environment in which the audiologists work, education level, type of education, etc.), personal attitudes/beliefs regarding hyperacusis and tinnitus, and the role audiologists should play within the assessment and management of hyperacusis and tinnitus. The questions were developed to collect information regarding the academic and clinical preparation on hyperacusis and tinnitus current practicing audiologists received as students.

Other sections of the questionnaire were designed to address the academic and clinical background of the participants regarding tinnitus, WS, and ASD. Inclusion of questions highlighting academic and clinical background within these specific

populations was determined on the reported prevalence of hyperacusis associated with tinnitus, WS, and ASD discussed in the review of the literature.

A pilot survey was sent via email to 9 practicing audiologists in Central Ohio, who serve as clinical preceptors for the AuD program at The Ohio State University in order to assess face validity of the survey. Responses from this survey were not included in the final analysis. Participants of the pilot survey were provided with a brief explanation of the study, and were asked to provide feedback regarding clarity, ease-of-use. Feedback from the participants was used to modify and develop the final version of the research survey (Appendix B).

CHAPTER 4

Results

The survey was sent to 1,302 subjects randomly selected from the membership of the American AAA. Sixteen message failures were received leaving a total of 1,286 subjects that received the initial contact email. Of the 1,286 subjects contacted, 261 completed the survey, a response rate of 20.3%.

Response Demographics

Demographic data for the 261 respondents information regarding highest degree obtained to date, as well as primary work environment and primary patient population are provided in Figures 2-4, respectively. The majority of survey respondents, 78.4%, reported the Doctor of Audiology (AuD) as their highest degree followed by 15.8% reporting a Master's degree and 5.8% with a Doctor of Philosophy degree.

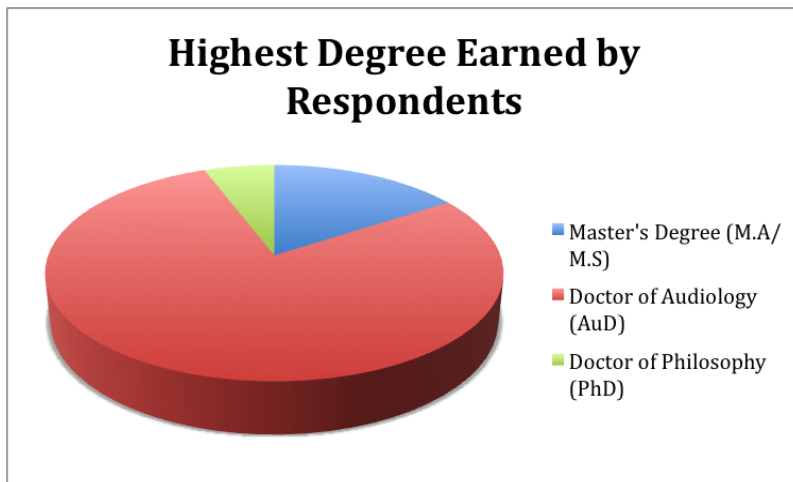


Figure 2: Highest Degree Earned reported by respondents

Private practice and Otolaryngology (ENT) practice were reported as the primary work settings for 29.6% and 23.9% of respondents, respectively (See Figure 3). Other work settings included in the survey were Hospital (18.9%), Speech and hearing clinic (3.7%), and University (5.8%) settings. Forty-four of the 261 respondents reported “other” as primary work environment. Self-reported responses of primary work environment included school districts, VA Medical Centers, Family Physician Centers, Multi-specialty clinics, etc.

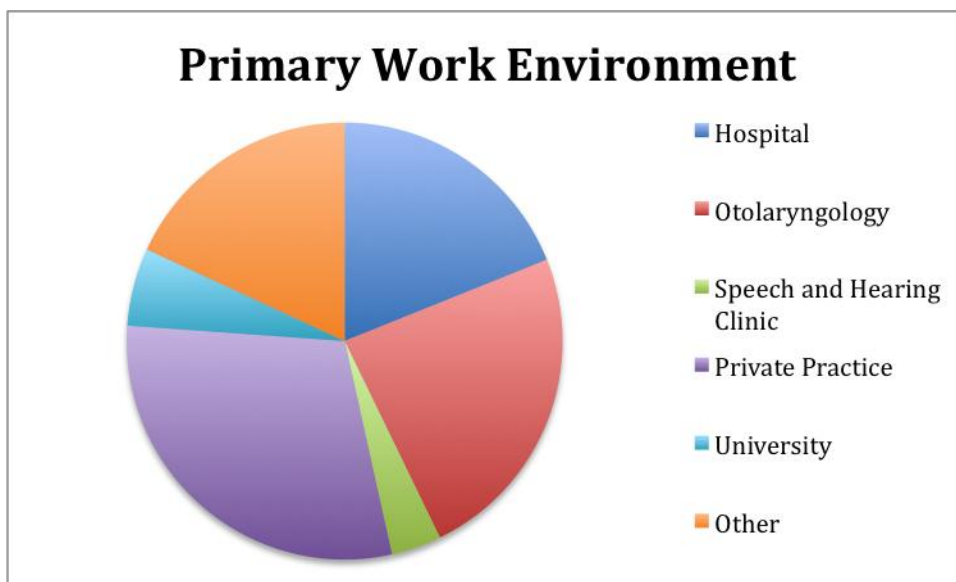


Figure 3: Primary Work Environment reported by respondents

As represented in Figure 4, adult and geriatric populations were reported as the primary patient population reported by survey respondents. Specifically, 48.1% of respondents reported a patient demographic of primarily adults and geriatric patients, with some pediatric patients, while 27.6% reported only adults and geriatrics as the primary patient population in their work environment. 9.2% of respondents reported a

work environment where the pediatric population as the primary patient demographic; followed by 5.4% of respondents reported primarily a pediatric population setting with some adult/geriatric patients. Twenty-three respondents selected “other” and provided a self-report of primary patient demographic in their work environment.

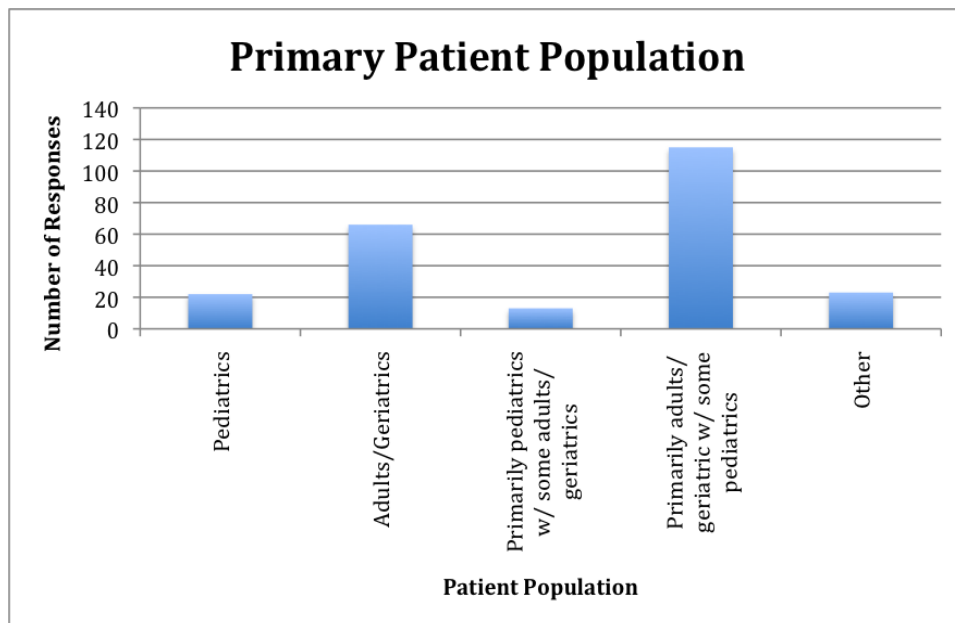


Figure 4: Primary Patient Population reported by respondents

Education & Training

Results indicated 79% of respondents having only “0-1” courses covering hyperacusis (or other sound sensitivity disorders) in their graduate curriculum followed by 19.8% reporting 2-3 courses, and 1.2 reporting 4 or more graduate courses covering the areas of sound sensitivity disorders. When asked about coursework that included tinnitus as part of doctoral/graduate education, increases in percentages were noted in comparison to sound sensitivity disorder exposure as shown in Figure 5, with 51.8%

reporting 0-1 courses, 41.8% reporting 2-3 courses, and 6.4% reporting 4 or more graduate courses focusing on tinnitus. Results also indicated that of the 19.8% and 41.8% reporting 2-3 courses covering hyperacusis and tinnitus, respectively, only 37.3% reported being “confident” in addressing hyperacusis with their patients and an equal 42.2% and 42.1% reporting awareness of hyperacusis assessment and treatments protocols, respectively.

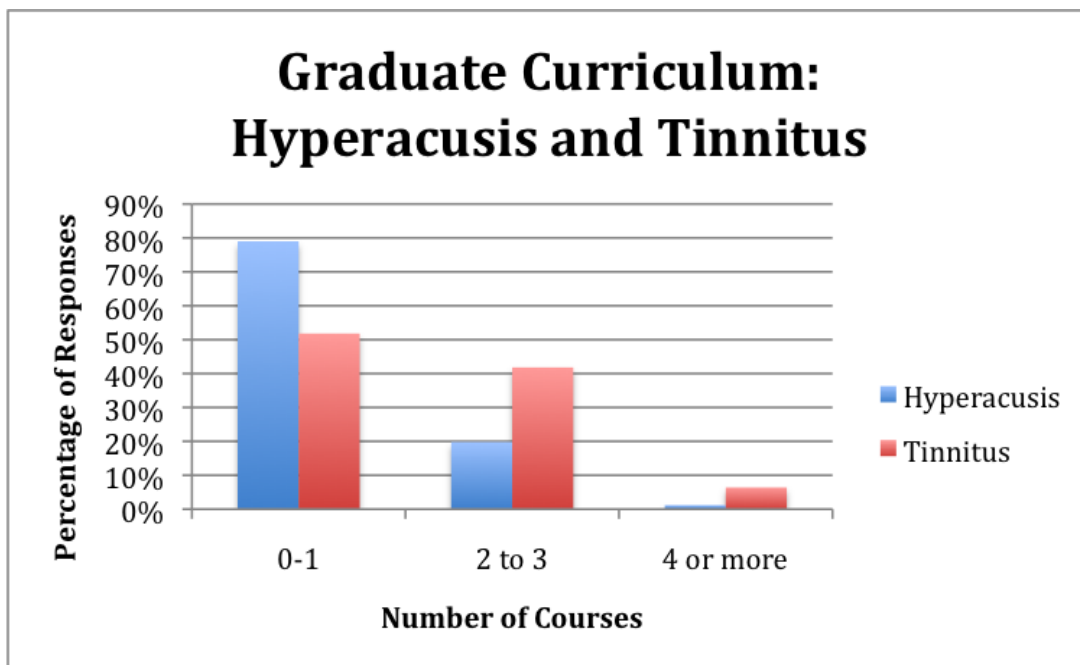


Figure 5: Graduate Curriculum reported by respondents

Questions regarding education/training as well as comfort level in working with specific populations, such as ASD and WS were addressed in the current survey. Of the total 261 respondents, 71.9% reported having 0-1 courses focusing on the special needs population, followed by 24.9% and 3.2% reporting 2-3 and 4 or more courses during their graduate education. Only 20.0% reported a “confident” level of comfort in working with

the special needs populations, with 23.6% pursuing continuing education in these topic areas. The importance of the previously stated percentages is shown when considering those survey respondents indicating a primarily pediatric patient demographic. Earlier statistics revealed that 9.2% of respondents work primarily with the pediatric population, and 48.1% have some clinic involvement with pediatric patients, which childhood is where these disorders are going to have the greatest impact.

Hyperacusis

Of the total of 261 respondents, 95% (or 245) responded “yes” when asked if they believe hyperacusis is within the audiology scope of practice. The remaining 5% of respondents reported that hyperacusis is not part of the audiology scope of practice. These respondents were asked to indicate what professional(s) was most appropriate to be responsible for the assessment and treatment of hyperacusis. Summarized in Figure 6, twenty responses were obtained regarding what professional(s) are most appropriate for the assessment and treatment of hyperacusis. Psychology/psychiatry and otolaryngology were the most frequent responses, as well as a multi-/interdisciplinary team approach. When asked of the practice’s current protocol for hyperacusis, respondents reported counseling (32.3%), assessment (8.5%), assessment and treatment (16.9%), referral (11.3%), none (21.0%), and other (10.1%). When asked to provide information regarding the most appropriate referral source for patients with hyperacusis, responses were consistent with the latter question of what professionals were deemed capable of addressing sound sensitivity disorders: Otolaryngologists/Otologists, University

clinics/hospitals, other audiologists, psychiatry/psychology, primary care physicians, and neurologists.

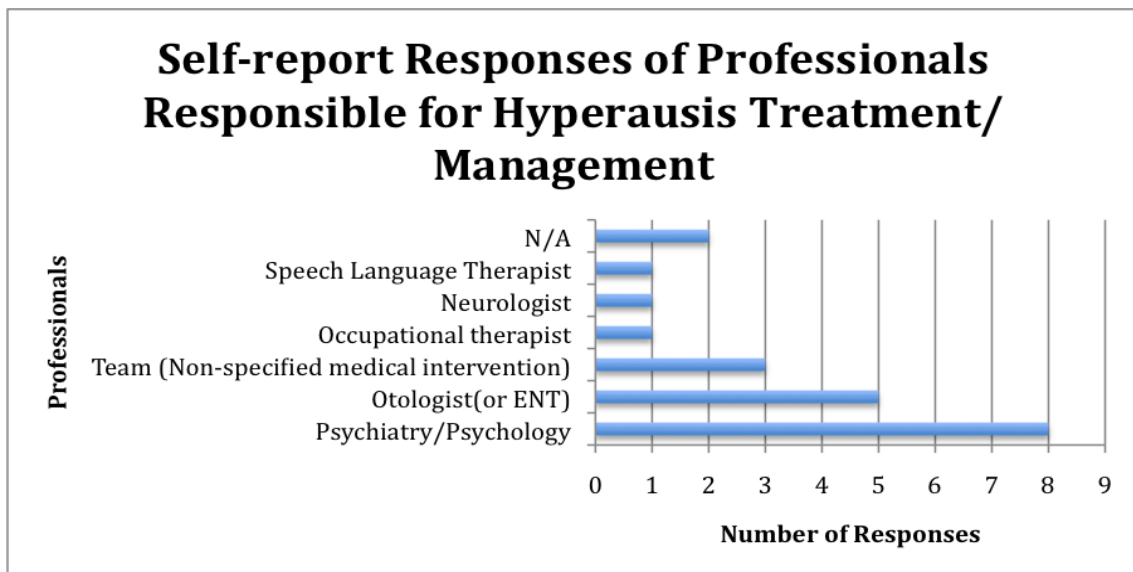


Figure 6: Self-reported responses regarding what professionals should be responsible for hyperacusis treatment/management

Despite the significant percentage of respondents reporting hyperacusis as a part of the audiology scope of practice, only 37.8% reported a “confident” comfort level in differentiating loudness recruitment and hyperacusis. Similarly, only 37.3% reported a “confident” comfort level in addressing hyperacusis with their patients. However, as shown in Figure 7, a comparable 35.9% and 36.1% reported a comfort level of “neither confident nor unconfident” in areas of differentiating loudness recruitment hyperacusis and addressing hyperacusis with patients, respectively.

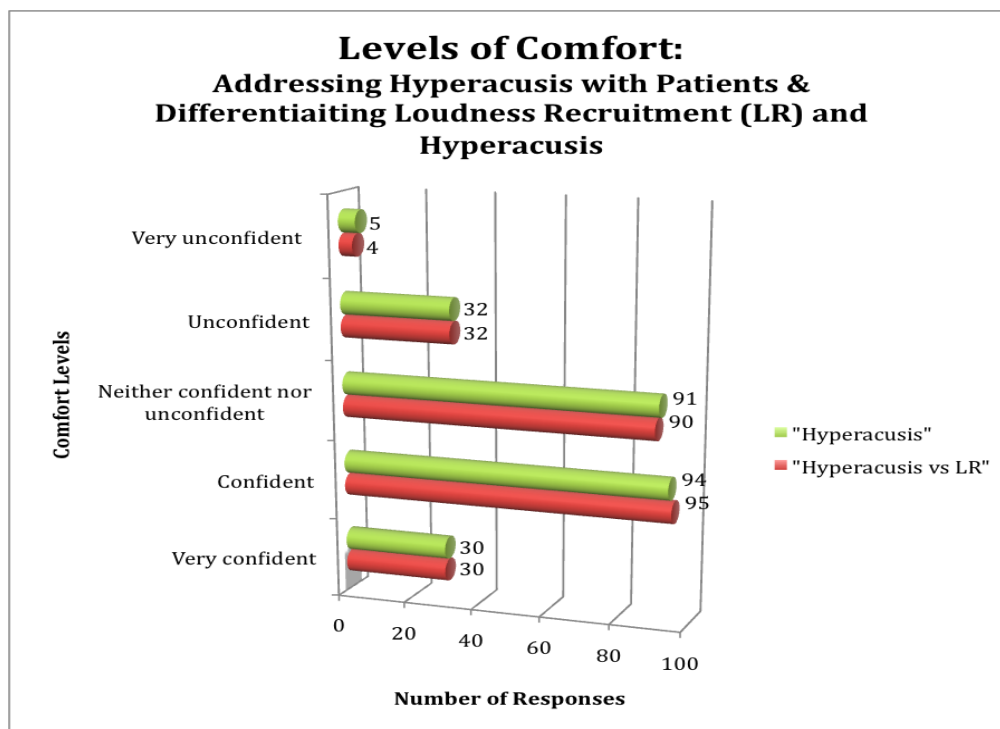


Figure 7: Levels of Comfort reported by respondents in addressing hyperacusis and it's differentiation from loudness recruitment with patients

CHAPTER 5

Discussion

The intent of this study was to evaluate the academic and clinical training background of practicing audiologists in the area of hyperacusis in order to gather information pertaining to the preparation of audiologists to address this disorder in the clinical setting. Current results indicated a lack of adequate education of audiologists in this area, despite the result that the majority (95%) of survey respondents believe that the assessment and management of hyperacusis is within the audiology scope of practice. Results indicated that 79% of respondents received only “0-1” course in their graduate program that focused on the area of hyperacusis, with 56.3% of the respondents reporting that the education they did receive during graduate school did not prepare them to address hyperacusis patients in a clinical setting. For example, it was found that few respondents felt confident in accurately differentiating loudness recruitment from hyperacusis (37.8%) as well as just addressing hyperacusis in general (37.3%) with their patients. This inability to differentiate hyperacusis and loudness recruitment is a particular problem due to the high prevalence of loudness recruitment seen as a symptom of cochlear hearing loss, a primary complaint seen in the audiology clinic.

Secondary emphasis was given to the academic and clinical preparation of audiologists in the area of tinnitus due to the parallels seen in the assessment and

management of hyperacusis and tinnitus. Due to these parallels, it was also assumed that if tinnitus were addressed in the academic curriculum, hyperacusis would also be addressed. The latter was assumed because, despite the differences in the disorders, hyperacusis assessment and management protocols are, for the most part, based on modified versions of tinnitus protocols (Jastreboff & Jastreboff, 2000; Jastreboff & Jastreboff, 2002). Therefore, it is surprising that based on the percentages of 19.8% and 41.8% reporting 2-3 courses covering hyperacusis and tinnitus, respectively, only 37.3% reported being “confident” in addressing hyperacusis with their patients and an equal 42.2% and 42.1% reporting awareness of hyperacusis assessment and treatments protocols, respectively.

Henry and colleagues (2005) found similar results in their study evaluating the academic focus on tinnitus. The authors surveyed the 60 accredited audiology programs regarding their status on inclusion of tinnitus in the academic curriculum. In general, results of that study concluded that the majority of respondents identified tinnitus to be included in the scope of practice of audiologists, yet of the responses from 47 programs, only 13 programs reported offering or planned to offer a course dedicated to tinnitus at that time (Henry et al., 2005). Today, there are 74 accredited AuD programs in the United States (AAA, 2012; ASHA, 2012). Curriculum outlines were available and accessible to the public on the program websites of 65 of the 74 programs. Each curriculum was reviewed, and only 9 programs were identified as offering a course solely dedicated to the study of hyperacusis and/or tinnitus. However, it should be mentioned that many programs offered courses entitled *advanced topics in audiology*, *special topics in*

audiology, auditory disorders, and seminars, where the areas of tinnitus and sound sensitivity disorders may or may not have been addressed. An example of such is the *Auditory Problems and Management in Adults* course offered at Ball State University, which includes the study of various topics in audiology such as assistive listening devices, cerumen managements, as well as tinnitus. Again, assuming that with tinnitus, hyperacusis will be discussed as a sister disorder commonly seen in association with tinnitus.

Though it is a positive that hyperacusis is possibly being addressed to some extent in graduate programs, one to two lectures in a course is not likely enough to be able to address the breadth needed to explain the complex neurophysiologic models used to describe hyperacusis. This is supported by the results of this study, in that audiologists are receiving some education and exposure to hyperacusis, but it is not adequately preparing them to address and differentiation this disorder from other sound tolerance issues in the clinical environment. Thus, the scarce availability of services to patients with hyperacusis may partially stem from the limited academic and clinical training provided to audiology students.

Another possible reason for the limited inclusion of hyperacusis in the academic curriculum is the variable definitions used to describe the disorder. Hyperacusis may be viewed as esoteric when compared to the broader, yet, better-defined areas of hearing aids, vestibular disorders, or cochlear implantation, for example. All audiologists may not provide all services in the scope of practice in their practice settings. For example, many audiologists do not provide balance services in their practices, although they are

expected to know when a patient needs to be referred for these services related to presenting concerns and/or other test results. The same is true of the areas of hyperacusis. Although not all audiologists may choose to provide management to this population, they should be able to educate other healthcare professionals regarding hyperacusis, and provide appropriate patient recommendations and referrals as needed, which would expand the breadth of available resources and services to patients.

Another way to expand the breadth of resources and services to patient is through a team approach to the assessment and management of hyperacusis. Also, a team approach would allow for interaction between audiologists and other healthcare professional promoting education and awareness on hyperacusis outside of the academic environment. An interdisciplinary healthcare team is a group of various healthcare professionals that work together to provide medical and therapeutic services including both the assessment and management of patients (Farrell, Schmitt, & Heinemann, 2001; Hall & Weaver; 2001). Respondents of the current survey were given two opportunities to provide information regarding other professionals that should be involved in the assessment or management of patients with hyperacusis, and interestingly, many respondents self-reported the idea of a team approach including otolaryngologists, psychologists, and psychiatrists, etc. Inclusion of these other healthcare professionals such as otolaryngologists and psychologists are already a part of assessment and management protocols, respectively, outlined in the literature (Newman et al., 2008). Audiologists are the key players in the TRT and ATM models. With the implementation of an interdisciplinary team approach, audiologists would have the opportunity to educate other

healthcare professionals and eliminate the distress from negative healthcare interactions patients receive from various healthcare professionals who told them that they were crazy, or that nothing could be done for them.

Lastly, the relationship between hyperacusis with disorders such as WS and ASD is another supporting factor for the importance of all audiologists gaining education in this area, even pediatric audiology, and hence another outlet for implementation of interdisciplinary healthcare. The pediatric population was the primary patient demographic for 9.2% of survey respondents, with 48.1% reporting a patient demographic with “some pediatric patients”, and 85.6% (209 of 244 respondents) reported working with patients with special needs within their primary patient demographic. Important to the current discussion, was the percentage of respondents working with the WS (19.7%) and ASD (63.9%) populations. Consider the increased benefit of an established interdisciplinary healthcare system for children with special needs whom need the more specialized care from a variety of professionals including but not limited to educational/early intervention services, speech language pathology, audiology, occupational therapy, physical therapy, psychology, and primary pediatric care (Kilgore & Langford, 2009; Thompson, 1982). Following the American Academy of Pediatrics (AAP) and the Center for Disease Control’s (CDC) latest updates on ASD, pediatric audiologists may see an influx in the number of patient with ASD seen in their practice.

Laboratory investigations, including audiologic assessment and lead screening, are recommended for any child with developmental delay and/or autism. Early referral for a formal audiologic assessment should include behavioral audiometric measures, assessment of middle ear

function, and electrophysiologic procedures using experienced pediatric audiologists with current audiologic testing methods and technologies. Lead screening should be performed in any child with developmental delay and pica. Additional periodic screening should be considered if the pica persists (CDC, AAP, and First Signs, 2012).

This is ample opportunity for those audiologists to take lead in the assessment/management of auditory disorders in children with special needs.

Conclusions and Clinical Implications

The findings of the present study support the hypothesis of limited academic and clinical focus on hyperacusis in the educational and clinical realms, which is consistent with the lack of focus on hyperacusis in the current research. However, it is promising that results indicated that 95% of respondents considered hyperacusis as part of the audiology scope of practice. The question is how does assessment and management protocols for hyperacusis become integrated into these clinics in order to appropriately address patient needs in a timely manner, unlike the individual in the case study discussed earlier.

De-mystifying the grey areas that surround hyperacusis could help increase the interests of audiologists in these areas, as well as help other healthcare professionals become more in-tuned with the existence of hyperacusis and management available to patients. To accomplish this, one must start at the beginning by providing education on assessment and management protocols in the AuD programs. Tyler (2006) described negative beliefs of audiologists, including the feelings of not being properly trained to help their patients, as an obstacle in tinnitus treatment. This could stem from the lack of education provided to audiology students in the area of tinnitus as shown in the study by

Henry and colleagues (2005). Relative to hyperacusis, one could make a similar comparison that the lack of education provided to audiology students in the area of hyperacusis as indicated by the present results of this survey, could lead to the same negative beliefs of audiologists about addressing hyperacusis in their clinics.

When considering the importance and the impact of auditory disorders on the field of audiology and its patients, the definitions of impairment, activity limitations, and participation restrictions provided by the World Health Organization should be addressed. ([WHO], 2012):

An impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations.

The neurophysiological model used to explain the mechanisms of hyperacusis, provided by Jastreboff and Jastreboff (2002), implicates various areas of daily living that can be affected or impaired by these disorders through the connection between peripheral/central auditory systems, and the possible involvement of the autonomic and limbic nervous systems. Affects on thoughts and emotions, hearing, sleep, and concentration can inevitably lead to activity limitation and participation restriction through areas of socialization, physical health, work, education, and economic (Tyler et al., 2009). The latter is a strong statement in support of the need for audiologists to have better education and training in the area of sound sensitivity disorders whether their choice is to assess and manage, or to refer. The field of audiology has matured in many ways, and this is another outlet for the field to continue to develop.

Limitations of Study and Future Directions

Although the current study had a 20.3% response rate, the ability to expand this survey to a greater subject population may help to eliminate possible bias of the current study related to the current subject population who were willing to respond to the survey had a greater interest in the area of hyperacusis. This bias would limit the ability to generalize findings of the current study to backgrounds and beliefs of the general audiology population. Another limitation of the current study is the results may not be representative of the profession as whole for two reasons. Although current results were well representative of the Academy, the subjects were recruited only from the American Academy of Audiology membership directory, which may limit this study's ability to be generalized to the responses of the "group" of audiologists that are not members of the Academy.

Second, repeating this study on a larger scale and with more precision by asking more focused questions may help to generate additional significant results than currently obtained through this study. For example, 79% of respondents reported receiving "0-1" courses regarding hyperacusis. It would have been more beneficial to this study's argument to separate number of course, "0" and "1", into separate answer choices. Based on this study's results, it is unknown what percentage of respondents did not receive any graduate course regarding hyperacusis. Finally, the lack of current literature on hyperacusis could also be seen as a limitation of the present study, with more literature allowing for a better directed and focused study.

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Appendix A

Dear Audiologist:

You are invited to participate in a research project that is part of my AuD Capstone project. The purpose of the study is to investigate the education, training, and reported comfort of practicing audiologists in the assessment and treatment of hyperacusis. I am inviting you to participate in this study because your name is listed on the American Academy of Audiology, which is available to the public.

If you agree to participate, please click on the link below and answer the questions on the brief survey. The survey should take no more than 10-15 minutes to complete. The survey includes questions regarding your graduate and post-graduate education and training as well as patient demographics as they pertain to the evaluation of education and training of audiologists in the assessment and treatment of hyperacusis. If you choose to participate, please respond as accurately as possible. If you choose not to participate, please disregard this email. A reminder e-mail will be sent to you in two weeks if you have not yet completed the survey. After this time, no further contact will be made. The survey will end on Wednesday, May 9th at 11:45_{P.M.}

The information you provide is confidential. Your responses will also remain anonymous to ensure that they cannot be linked to you. There are no anticipated risks from participating in this study.

Thank you for your time and consideration. It is my hope that information obtained from this survey will benefit our profession and our patients. Please feel free to contact my academic advisor, Dr. Gail M. Whitelaw, or myself if you should have questions or require additional information. For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.

<https://www.surveymonkey.com/s/7RNN8GP>

Ashley N. Mason, B.S.
Doctor of Audiology 2013
mason.540@osu.edu

Gail M. Whitelaw, PhD
Academic Advisor
whitelaw.1@osu.edu

Department of Speech & Hearing
Sciences
The Ohio State University
110 Pressey Hall
1070 Carmack Road
Columbus, Ohio 43210

Appendix B

Questionnaire

1. Please indicate the highest degree obtained to date:
2. Where did you attend graduate school?
3. How would you define hyperacusis?
4. Do you believe it is within the audiology scope of practice to assess and treat hyperacusis?
5. If no, what profession(s) do you believe is most capable of the assessment and treatment of hyperacusis?
6. What was your approximate comfort level in differentiating loudness recruitment and hyperacusis?
7. What was your approximate comfort level in addressing hyperacusis with your patients?
8. Were you aware of assessment protocols for hyperacusis?
9. Were you aware of treatment protocols for hyperacusis?
10. How many graduate courses addressed the topic of hyperacusis (or sound sensitivity issues)?
11. Did you find the information in the course(s) to be helpful in preparing you to interact with patients with hyperacusis (or sound sensitivity issues)?
12. Have you participated in continuing education or training regarding hyperacusis since graduation?
13. If yes to previous question, where did you obtain education/training regarding hyperacusis?
14. Upon graduation, what was your approximate comfort level in addressing tinnitus with your patients?
15. How many graduate courses addressed the topic of tinnitus?
16. Have you participated in continuing education or training regarding tinnitus?

17. If yes to previous question, where did you obtain education/training regarding tinnitus?
18. Upon graduation, what was your approximate comfort level in assessing and treating patients with special needs, such as Williams syndrome or Autism Spectrum Disorders?
19. How many graduate courses addressed the topic of populations with special needs, such as Williams syndrome and Autism Spectrum Disorders?
20. Have you participated in continuing education or training regarding populations with special needs, such as Williams syndrome and Autism Spectrum Disorders?
21. If yes to previous question, where did you obtain education/training regarding populations with special needs, such as Williams syndrome and Autism Spectrum Disorders?
22. Please identify your primary work environment:
23. Please identify your primary patient demographic:
24. Does your patient demographic include patients with special needs (check all that apply)?
25. What is your practice's current protocol for hyperacusis?
26. If referral, where do you refer patients?
27. What is your practice's current protocol for tinnitus?
28. If referral, where do you refer patients?